

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/JP2004/017130

International filing date (day/month/year)
11.11.2004

Priority date (day/month/year)
14.11.2003

International Patent Classification (IPC) or both national classification and IPC
H04B7/06, H04B7/08

Applicant
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/017130

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3,7-13,15-18,20-23
	No: Claims	1,2,4-6,14,19
Inventive step (IS)	Yes: Claims	
	No: Claims	1-23
Industrial applicability (IA)	Yes: Claims	1-23
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: MIMO Antenna System for Multi-User Multi-Stream Orthogonal Space Division Multiplexing. Z. G. Pan, K. K. Wong, and T. S. Ng. Departament of Electrical & Electronic Engineering. The University of Hong Kong. 11-15 May 2003.

D2: A channel oriented Joint Transmission scheme for MIMO multi-user downlinks. H. Tröger, W. Qiu, M. Meurer, C.A. Jötten. Research Group for RF Communications, University of Kaiserslautern. COST 273. 28-31 May 2002.

1 Novelty (Article 33(2) PCT) and Inventive Step (Article 33(3) PCT)

- 1.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 14, 17, 19 is either not new or inventive (Articles 33(2) and Article 33(3) PCT).
- 1.2 D1, discloses all features of independent claim 1 (the citations and references in parentheses applying to this document):

A wireless communication system comprising:
a base station; a plurality of terminals; and a control unit,

- 1.2a) - wherein said base station and each of said plurality of terminals are operable to simultaneously perform space division multiplex wireless transmission of information using a same frequency (cf. III MULTI-USER MULTI-STREAM ORTHOGONAL SPACE DIVISION MULTIPLEXING, lines 1-5. A system with Code Division Multiplexing or Time Division Multiplexing is considered to use a same frequency band);
- 1.2b) - wherein at least one of said plurality of terminals communicates with said base station via a plurality of propagation paths (The presence of multipath is implicit in D1);

- 1.2c) - wherein said base station comprises a base station multibeam antenna used for the space division multiplex wireless transmission,
- wherein said base station multi-beam antenna comprises a plurality of base station antenna elements,
- wherein each of said plurality of terminals comprises a terminal multi-beam antenna used for the space division multiplex wireless transmission,
- wherein said terminal multi-beam antenna comprises a plurality of terminal antenna elements (cf. II. MULTI-USER MIMO MODEL).

- 1.2d) - wherein said control unit is operable to orthogonalize a beam pattern of said base station multi-beam antenna, thereby controlling the space division multiplex wireless transmission (cf. III MULTI-USER MULTI-STREAM ORTHOGONAL SPACE DIVISION MULTIPLEXING).

1.3 Therefore claim 1 does not meet the requirements of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

1.4 D1, discloses the following features of independent claim 14 (the citations and references in parentheses applying to this document):

1.4a) A base station for a wireless communication system (...) , said base station comprising:

1.4b) - a base station multi-beam antenna comprising a plurality of base station antenna elements; and (cf. II MULTI-USER MIMO SYSTEM MODEL);

1.4c) - an antenna-controlling unit operable to control the space division multiplex wireless transmission via said plurality of base station antenna elements (cf. III MULTI-USER MULTI-STREAM ORTHOGONAL SPACE DIVISION MULTIPLEXING. The presence of an kind of controlling unit is implicit in D1);

1.4d) - wherein said antenna-controlling unit is operable to calculate a plurality of transfer function values determining a radio-wave-propagation characteristic between said plurality of base station antenna elements and said plurality of terminal antenna

elements (cf. H_m channel matrix for the BS to the MS_m given by (5)) to orthogonalize a beam pattern of said base station multi-beam antenna based on the determined radio-wave-propagation characteristic (cf. III. MULTI-USER MULTI-STREAM ORTHOGONAL SPACE DIVISION MULTIPLEXING);

- 1.5 Therefore claim 14 does not meet the requirements of Article 33(2) PCT, because the subject-matter of claim 14 is not new.
- 1.6 D1, discloses the following features of independent claim 17 (the citations and references in parentheses applying to this document):
A terminal for a wireless communication system (...), said terminal comprising:
- 1.6a) - a terminal multi-beam antenna comprising a plurality of terminal antenna elements (cf. II. MULTI-USER MIMO SYSTEM MODEL).
- 1.6b) - a pilot signal-generating unit operable to generate pilot signals used for estimation of a radio-wave propagation characteristic between said base station and said terminal, wherein said terminal multi-beam antenna is operable to transmit to said base station the pilot signals generated by said pilot signal-generating unit (In D1 the channel characteristic is estimated. The use of pilot signals sent from the mobile stations to estimate the channel characteristics is implicit in D1).
- 1.7 Therefore the subject-matter of independent claim 17 is not considered new (Article 33(2) PCT).
- 1.8 Taking into account all above arguments, it is considered that the subject-matter of the independent method claim 19 is not new either.
- 1.9 Besides dependent claims 2-13, 15, 16, 18, 20-23 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (see D1).
- 1.10 It is pointed out also D2 could be used to object on novelty or/and inventive step for all claims.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/JP2004/017130